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Rippel

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[54] **METHOD AND MEANS FOR HARVESTING GRAIN**

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[51] **Int. Cl.**[6] **A01D 34/40**; A01D 34/04

[52] **U.S. Cl.** **56/14.6**; 56/16.5; 56/122; 56/DIG. 5; 460/119

[58] **Field of Search** ..... 56/14.6, 13.3, 56/16.5, 16.6, 122, 14.5, DIG. 5; 460/119, 111, 112, 21, 114

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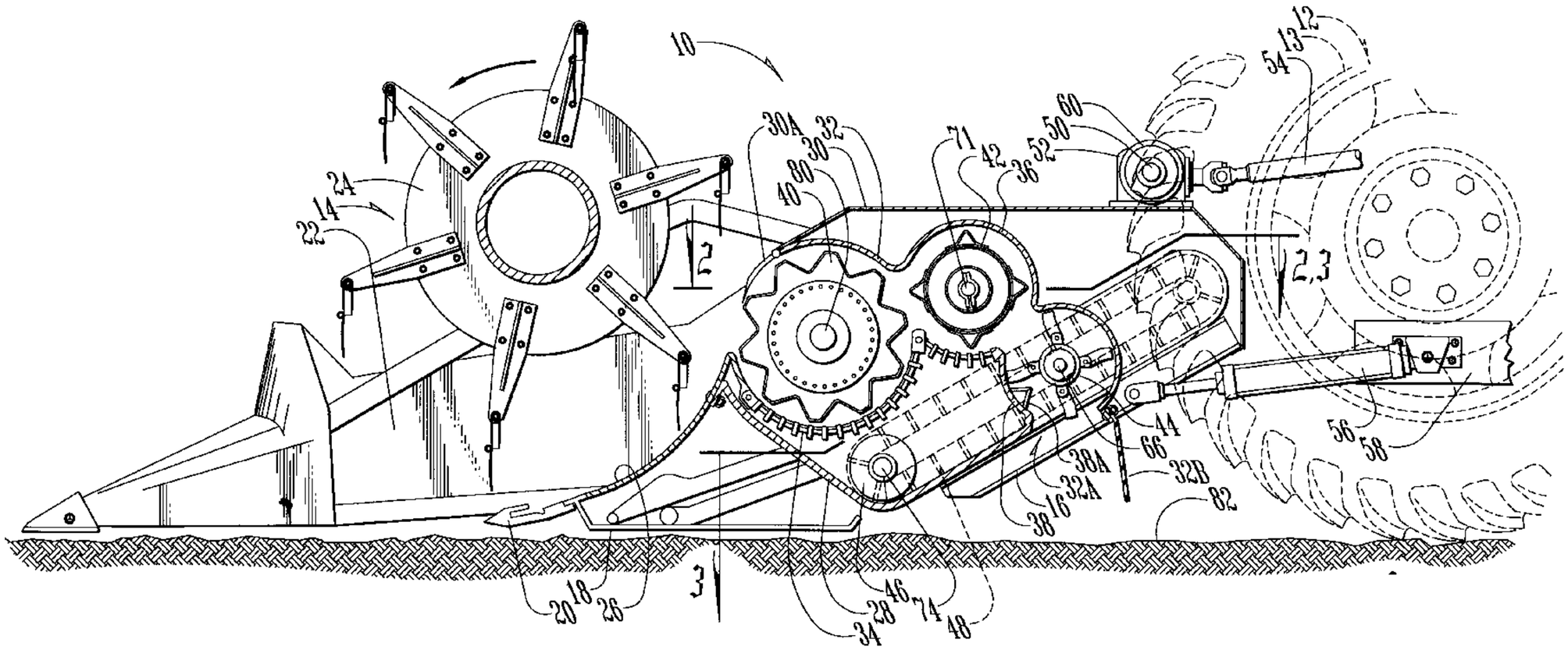
Attorney, Agent, or Firm—Zarley, McKee, Thomte, Voorhees & Sease

[57] **ABSTRACT**

A method of harvesting grain involves placing a cutting and harvesting head on the front of a prime mover, moving the prime mover and the head through a field of mature grain plants with grain thereon. The grain bearing plants are then cut with the head, and then moved to a grain separating station on the head. The grain is then separated from the plants within the head, captured, and then moved to a grain reservoir on the prime mover. The severed plants are then deposited into the field after the grain is separated therefrom. A combine or prime mover has a grain harvesting head on the forward end thereof. A cutter bar or the like is on the head to cut grain bearing field plants. A conveyor moves the cut plants to threshing elements on the head for separating grain from the severed plants. A grain conveyor on the head moves the grain to a grain reservoir on the combine. An exit port is on the head for depositing all of the plants in the head on the field from which the plants were cut.

6 Claims, 3 Drawing Sheets



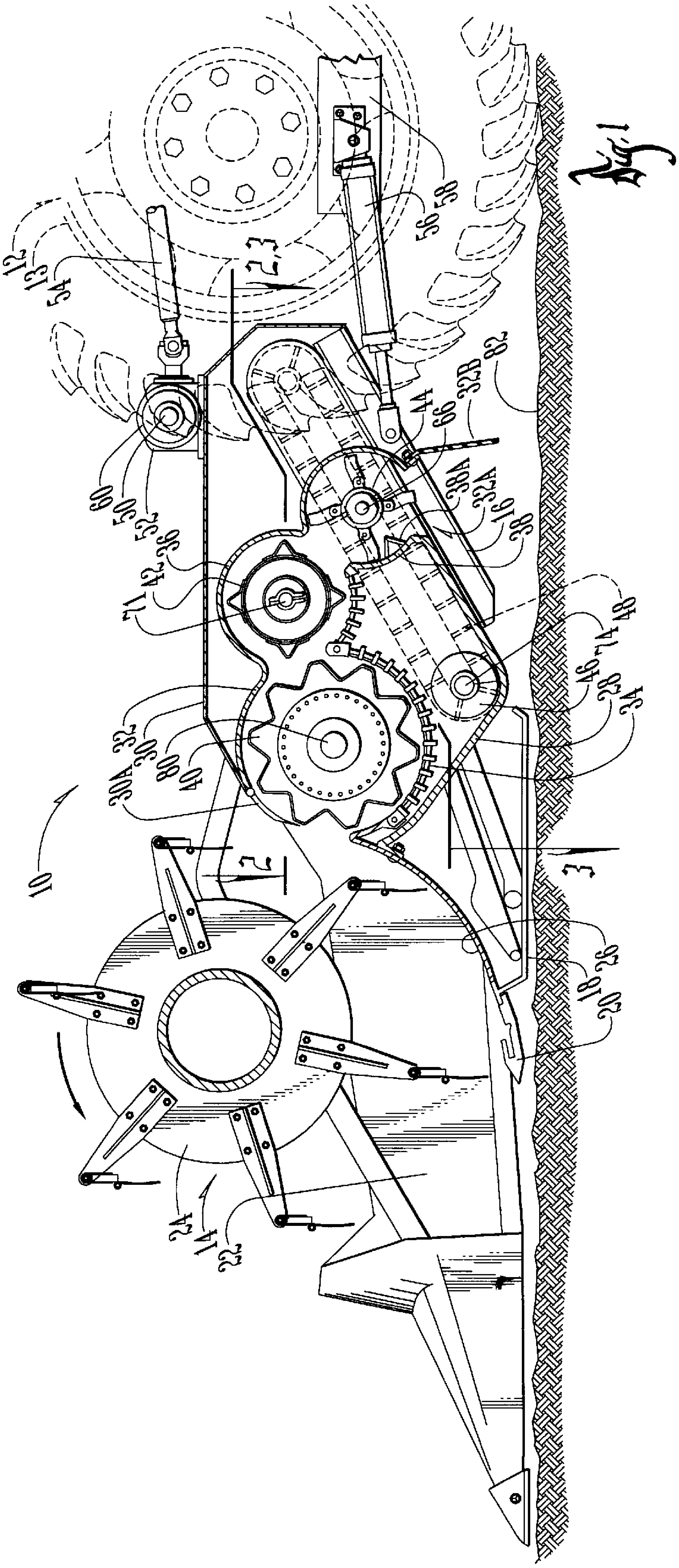


Fig. 1
12
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71
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80
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30A
10
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14
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82
32B
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38A
32A
16
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48
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34
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3
26
18
20

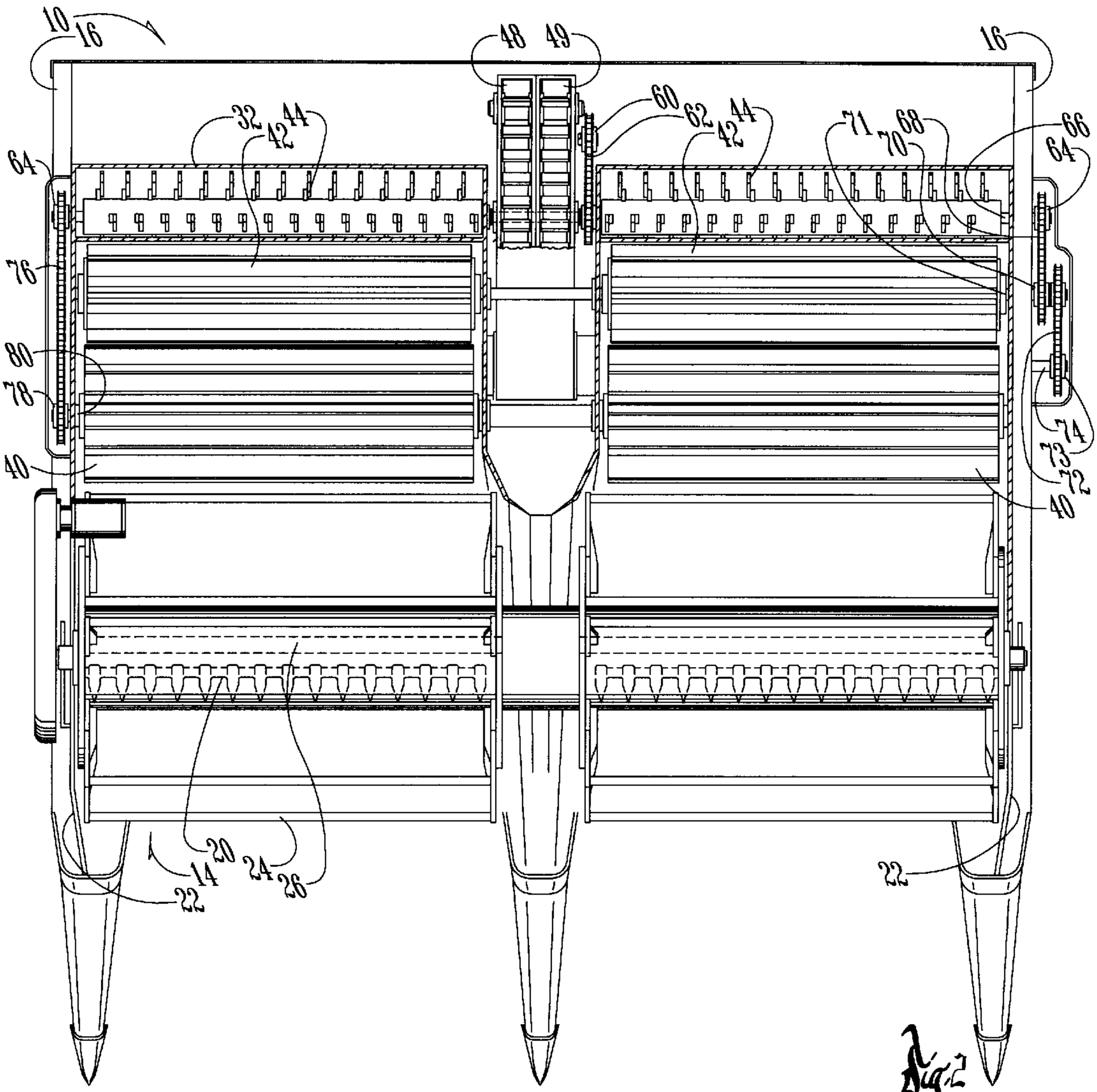
10
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Fig. 2

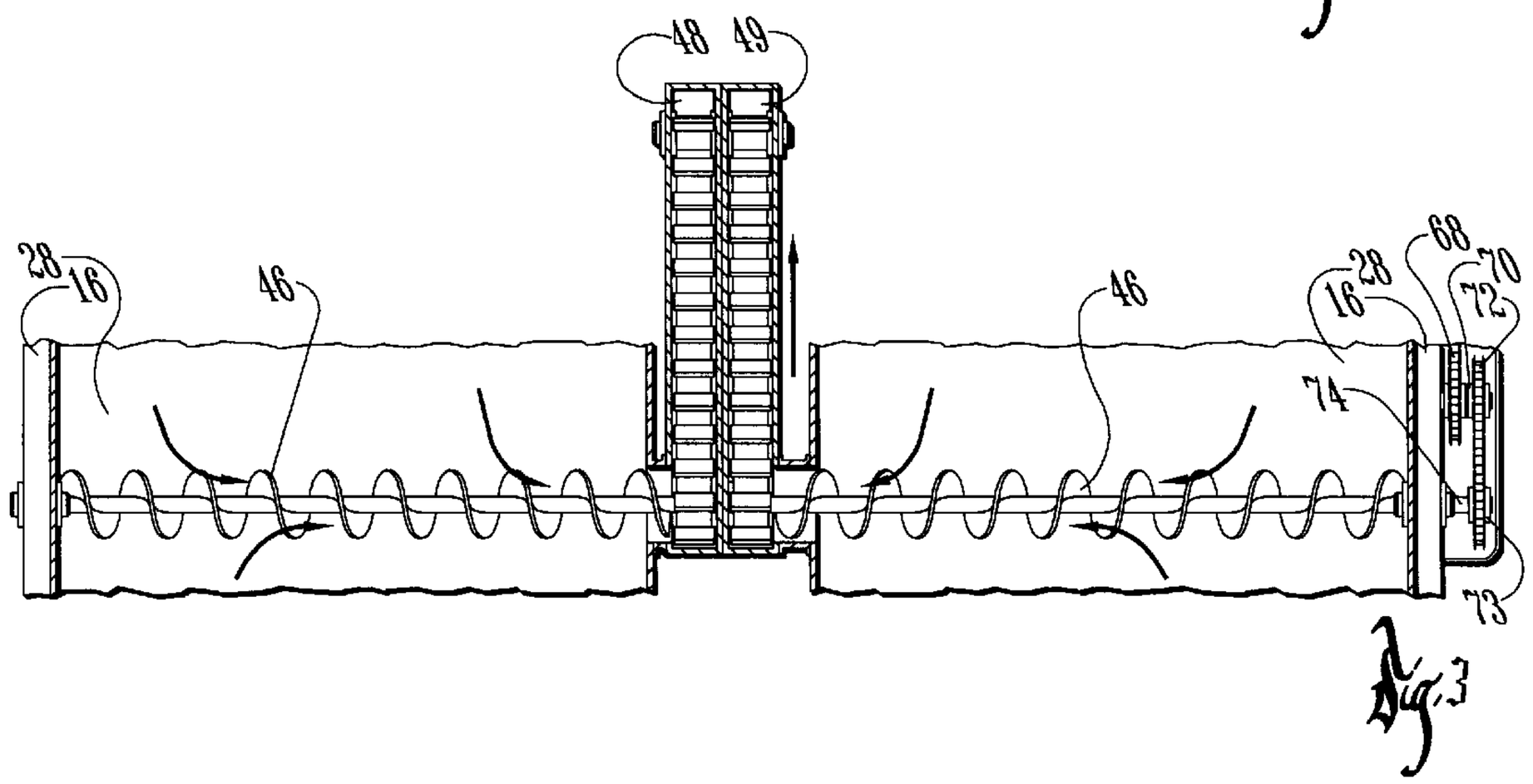
48
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Fig. 3

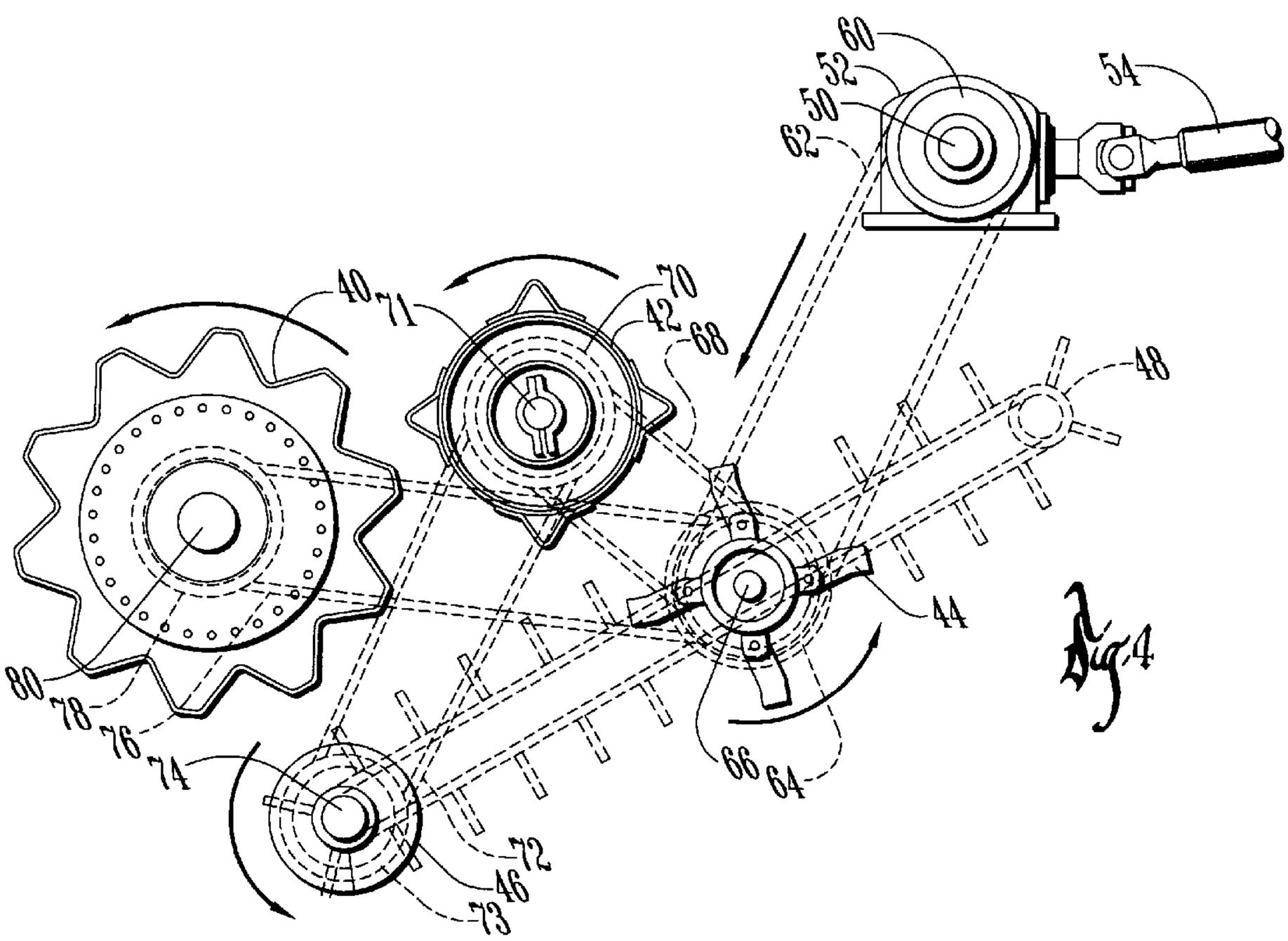

Fig-4

METHOD AND MEANS FOR HARVESTING GRAIN

BACKGROUND OF THE INVENTION

Machines for harvesting grain such as corn, soybeans, wheat, oats and the like are typically comprised of combines with an appropriate harvesting head detachably mounted on the front thereof. The combine is the prime mover of the machinery and powers the moving components on the head. The conventional machines normally use one type of head to harvest corn, and a different head to harvest soybeans, wheat, oats, and the like. However, all these heads have a plant cutting mechanism which severs the plants close to the ground level, and moves the cut plants to the combine where the grain is separated from the plants. The grain is gathered, cleaned, and conveyed to a grain reservoir, all within the combine. The plants from which the grain is severed are moved longitudinally through the combine, and deposited onto the surface of the field from the rearward end of the combine.

The mass of the severed plants represents tons of residue in a field of any size. Residue from corn plants is sometimes baled for roughage feed for cattle in bales weighing 1,500 to 2,000 pounds or greater. However, running this great quantity of severed plants through the combine is obviously a great burden on the combine which must provide the power to move the plants through the combine to a rearward point of deposit.

It is therefore a principal object of this invention to provide a method and means for harvesting grain wherein the grain is separated from the plant in the head instead of the combine, and the severed plants are deposited in the field from the head without moving through the combine.

These and other objects will be apparent to those skilled in the art.

SUMMARY OF THE INVENTION

A method of harvesting grain involves placing a cutting and harvesting head on the front of a prime mover, moving said prime mover and said head through a field of mature grain plants with grain thereon. The grain bearing plants are then cut with the head, and then moved to a grain separating station on the head. The grain is then separated from the plants within the head, captured, and then moved to a grain reservoir on the prime mover. The severed plants are then deposited into the field directly from the head after the grain is separated therefrom.

A combine or prime mover has a grain harvesting head on the forward end thereof. A cutter bar or the like is on the head to cut grain bearing field plants. A conveyor moves the cut plants to threshing elements on the head for separating grain from the severed plants. A grain conveyor on the head moves the grain to a grain reservoir on the combine. An exit port is on the head for depositing all of the plants in the head on the field from which the plants were cut.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a partial longitudinal sectional view of a combine with a harvesting head of this invention mounted thereon;

FIG. **2** is a plan view of a harvesting head of this invention;

FIG. **3** is a sectional view taken on line **3**—**3** of FIG. **1**; and

FIG. **4** is a side schematic view of the internal components of the harvesting head.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The harvesting machine **10** is comprised of a combine or prime mover **12** which is driven by wheels **13**. A harvesting head **14** is mounted on the forward end of the combine.

A subframe **16** comprises a part of the harvesting head. A platform **18** is mounted on the forward edge thereof and a conventional cutter bar **20** is located on the forward end of the platform. Conventional side panels **22** (FIGS. **1** and **2**) are located on the sides of the head **14** A conventional reel **24** is rotatably mounted on the head **14** and is adapted to move the plants to be harvested in towards the cutter bar **20** in conventional fashion. An arcuate panel **26** (FIG. **1**) is located immediately rearwardly of the cutter bar **20** and facilitates the movement of the severed plants rearwardly into the head. The foregoing components are conventional in combine heads used for soybeans and the like, and the conventional power drives for various of these components have not been shown.

As seen in FIG. **1**, a V-shaped housing floor **28** has its forward edge secured to arcuate panel **26** and extends downwardly and thence upwardly therefrom. An upper housing **30** has its lower rearward edge secured to subframe **16** of head **14** and extends upwardly and thence horizontally, and thence forwardly and downwardly and terminates in a hinged cover **30**A. An upper subhousing **32** is secured to and extends rearwardly from upper housing **30** and hag three arcuate portions which terminate in an exit port **32** at the rearward end thereof (FIG. **1**). A cover **32**B is hingedly secured to the rearward end of subhousing **32** to close the exit port **32**A if desired.

A conventional combine concave **34** is secured to the rearward end of arcuate panel **26** and is located within head **14**. A smaller arcuate concave **36** is secured to the rearward end of concave **34**. Similarly, a smaller wall **38** is secured to the rearward end of concave **36** with the other end being secured to housing floor **28**. A conventional knife element **38**A is secured to wall **38**.

A conventional threshing cylinder **40** is positioned concentrically with concave **34**. Similarly, a conventional beater **42** is concentrically mounted with respect to concave **36**. In like manner, a conventional combine chopper **44** is mounted within head **14** and is concentrically located with respect to wall **38**.

A conventional horizontal grain auger **46** is mounted in the bottom of housing floor **28** (FIG. **1**). A conventional grain conveyor **48** (FIGS. **1** and **2**) is mounted within housing floor **28** and extends upwardly and rearwardly within the head **14**. A similar grain conveyor or elevator **49** (FIG. **2**) extends upwardly in parallel relationship to conveyor **48** (FIG. **2**) with conveyor **48** receiving grain delivered by the left-hand end of auger **46** (FIG. **3**) and with conveyor **49** receiving grain delivered from the right-hand end of auger **46**. See the arrows in FIG. **3** which show the direction of flow of grain to the conveyors **48** and **49**.

As shown best in FIG. **4**, the horizontal axis of shaft **50** of head **14** is the pivotal axis for head **14** and extends from gear box **52** mounted on the top of upper housing **30**. A drive shaft **54** extending from a power source (not shown) on combine **12** extends into gear box **52** and provides a source of power to shaft **50** extending horizontally out of the gearbox **52**.

A conventional lift cylinder **56** is attached to combine frame **58** (FIG. **1**) to raise and lower the head **14** with respect to the combine **12** as desired.

A pulley **60** is mounted on shaft **50** and supports one end of belt **62** (FIG. **4**). The other end of belt **62** embraces pulley **64** mounted on shaft **66** upon which the chopper **44** is mounted. A belt **68** (FIG. **4**) extends from pulley **64** upwardly to pulley **70** which is mounted on shaft **71** which supports beater **42**. Belt **72** extends from pulley **70** downwardly towards pulley **73** on shaft **74**. Shaft **74** is the shaft of auger **46** and is the drive shaft for conveyors **48** and **49**.

A belt **76** extends from the pulley **64** on shaft **66** and extends to the pulley **78** on shaft **80** which supports the threshing cylinder **40**.

The numeral **82** in FIG. **1** designates the surface of a field in which grain bearing corn, soybean plants or the like are growing.

It should be understood that the concaves **34**, **36**; the threshing cylinder **40**, beater **42**, chopper **44**, and auger **46**; and various forms of conveyors **48** and **49** are normally located within the combine **12**.

In operation, the combine or prime mover **12** moves the head **14** through the field wherein grain bearing plants exist. In the case of soybeans, wheat, oats or the like, the reel **24** draws the plants into contact with the reciprocating cutter bar **26** and sweeps the cut plants up the arcuate panel **26** into the area of the head between housing **32** and floor **28** to cause the plants to move between the threshing cylinder **40** and the concave **34**. This action severs the grain from the plants and the grain moves through the conventional openings within concave **34**.

The beater **42** performs its conventional function with respect to the severed plants and serves to complete the threshing action by further severing grain from the plants which passes through concave **36**. The severed plants then move into contact with chopper **44**, and then move through exit port **32**A for deposit in the field surface **82**.

As a result, the voluminous tonnage of the severed plants is quickly and immediately deposited within the field and is not cause to be conveyed through the combine **12**.

With reference to FIGS. **2** and **3**, the grain separated from the plants and passing through concaves **34** and **36** moves downwardly to the bottom of housing floor **28** and is moved horizontally by auger **46** to the central portion of the head **14**. The grain captured by the left-hand end of auger **46** as seen in FIG. **3** moves onto conveyor **48**. Similarly, the grain captured by the right-hand end of auger **46** moves towards the center of the head to be deposited on the lower end of conveyor **49**. The separated grain is then carried upwardly on conveyors **48** and **49** for deposit on conventional cleaning or shaker elements within the combine and for ultimate deposit in grain reservoir tanks (not shown).

When harvesting corn, conventional harvesting components other than reel **24** and cutter bar **20** are used, and the separated grain bearing corn plants are moved rearwardly to be treated by threshing cylinder **40**, beater **42**, and chopper **44** in the manner described above. It is thus seen that this

invention will achieve its principal object by substantially completing the harvesting operation within the confines of the head **14** without having to move the vast bulk of the severed plants through the combine.

What is claimed is:

1. A method of harvesting grain, comprising,

detachably placing a cutting and harvesting head on the front of a prime mover so that the prime mover is positioned rearwardly of the head,

moving said prime mover and said head forwardly through a field of mature grain plants with grain thereon,

cutting said plants with said head and moving said cut plants rearwardly to a grain separating station on said head,

separating said grain from said plants within said head,

capturing said grain which is separated from said plants within said head and moving the same rearwardly to a grain reservoir on said prime mover,

and depositing all of the plants from said head directly onto said field forwardly of the prime mover after said grain is separated therefrom.

2. The method of claim **1** wherein said plants are chopped into small plant particles within said head before being deposited in said field.

3. The method of claim **1** wherein said plants are cut by said head at an elevation adjacent to the level of said field so that a substantial portion of said plants will pass into said head.

4. The combination of a prime mover having a front end, and

a grain harvesting head detachably mounted on the front end of said prime mover, comprising,

a field plant cutter on said head forwardly of the prime mover and adapted to cut a plurality of grain bearing plants as said prime mover moves forwardly through a field in which grain bearing plants are growing,

conveyor means on said head for moving plants cut by said cutter into said head,

threshing elements in said head for separating grain from said plants moved into said head,

grain conveying means on said head for receiving and rearwardy conveying grain separated from said plants to a grain reservoir on said prime mover,

and an exit port on said head forwardly of the prime mover for depositing all of said plants in said head on the field from which said plants are cut.

5. The combination of claim **4** wherein said head is detachably secured to said prime mover.

6. The combination of claim **4** wherein a chopper is mounted in said head to chop into small particles the plants within said head before being deposited in said field.

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